

BOARD FOR PROFESSIONAL & OCCUPATIONAL REGULATION



STUDY OF THE UTILITY AND VALIDITY OF VOICE STRESS ANALYZERS



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Background

On March 26, 2003, Governor Warner signed into law House Bill 2812 and Senate Bill 1296 which provide for the use of alternative truth detection devices, specifically, Computer Voice Stress Analyzers under such conditions determined by the Director.

On May 15, 2003, after reviewing the new law and acknowledging their inexperience with this new technology, the Polygraph Examiners Advisory Board directed staff to approach the Board for Professional and Occupational Regulation (BPOR) and request a study be conducted of the Computer Voice Stress Analyzers (CVSA).

On June 2, 2003, the BPOR, after listening to extensive public comment, reviewed the request made by the Polygraph Advisory Board and agreed to complete the study.

Section 54.1-1805 (Effective until July 1, 2005) of the *Code of Virginia* outlines the instruments to be used by polygraph examiners and approval of other instruments by the Director.

- A. Each examiner shall use an instrument that records permanently and simultaneously the subject's cardiovascular and respiratory patterns as minimum standards, but such an instrument may record additional physiological changes pertinent to the determination of truthfulness.
- B. In addition, the Director may approve the use of other instruments that record physiological changes pertinent to the determination of truthfulness or the verification of the truth of statements, including a computer voice stress analyzer, by examiners licensed under this chapter under such conditions as determined by the Director. Such conditions shall include a provision requiring the examiner, prior to the use of such instrument, to (i) complete a Director-approved training course on its operation and (ii) be certified by the manufacturer on the use of such instrument. However, no instrument approved pursuant to this subsection shall be used by a police department in conducting a background investigation of an applicant for employment as a police officer or in administrative investigations involving a police officer.

(1975, c. 522, § 54-922; 1988, c. 765; 2003, cc. 545, 554.)

§ 54.1-1805. (Effective July 1, 2005) Instrument to be used.

Each examiner shall use an instrument which records permanently and simultaneously the subject's cardiovascular and respiratory patterns as minimum standards, but such an instrument may record additional physiological changes pertinent to the determination of truthfulness.

(1975, c. 522, § 54-922; 1988, c. 765; 2003, cc. 545, 554.)

Statutory Authority

§ 54.1-310 of the *Code of Virginia (Code)* provides the statutory authority for the Board for Professional and Occupational Regulation (the Board) to study and make recommendations to the General Assembly on the need to regulate professions or occupations and, if so, the degree of regulation that should be imposed.

The Board has the authority to advise the Governor and the Director on matters relating to the regulation of professions and occupations. In addition, the General Assembly may request that the Board conduct a study. The General Assembly is the body empowered to make the final determination of the need for regulation of a profession or occupation. The General Assembly has the authority to enact legislation specifying the profession to be regulated, the degree of regulation to be imposed, and the organizational structure to be used to manage the regulatory program (e.g., board, advisory committee, registry).

The Commonwealth's philosophy on the regulation of professions and occupations is that: ***The occupational property rights of the individual may be abridged only to the degree necessary to protect the public.*** This tenet is clearly stipulated in statute and serves as the Board's overarching philosophy in its approach to all its reviews of professions or occupations:

. . . the right of every person to engage in any lawful profession, trade or occupation of his choice is clearly protected by both the Constitution of the United States and the Constitution of the Commonwealth of Virginia. The Commonwealth cannot abridge such rights except as a reasonable exercise of its police powers when it is clearly found that such abridgement is necessary for the preservation of the health, safety and welfare of the public. (*Code of Virginia § 54.1-100*)

Further statutory guidance is provided in the same *Code* section which states that the following conditions must be met before the state may impose regulation on a profession or occupation:

1. The unregulated practice of a profession or occupation can harm or endanger the health, safety or welfare of the public, and the potential for harm is recognizable and not remote or dependent upon tenuous argument;
2. The practice of the profession or occupation has inherent qualities peculiar to it that distinguish it from ordinary work or labor;
3. The practice of the profession or occupation requires specialized skill or training and the public needs, and will benefit by, assurances of initial and continuing professional and occupational ability; and
4. The public is not effectively protected by other means.

Pursuant to § 54.1-311 of the *Code*, when the Board recommends that a particular profession or occupation be regulated, or that a different degree of regulation should be imposed on a regulated profession or occupation, it shall consider the following degrees of regulation in order:

1. Private civil actions and criminal prosecutions. – Whenever existing common law and statutory causes of civil action or criminal prohibitions are not sufficient to eradicate existing harm or prevent potential harm, the Board may first consider the recommendation of statutory change to provide more strict causes for civil action and criminal prosecution.
2. Inspection and injunction. – Whenever current inspection and injunction procedures are not sufficient to eradicate existing harm, the Board may promulgate regulations consistent with the intent of this chapter to provide more adequate inspection procedures and to specify procedures whereby the appropriate regulatory board may enjoin an activity which is detrimental to the public well-being. The Board may recommend to the appropriate agency of the Commonwealth that such procedures be strengthened or it may recommend statutory changes in order to grant the appropriate state agency the power to provide sufficient inspection and injunction procedures.
3. Registration – Whenever it is necessary to determine the impact of the operation of a profession or occupation on the public, the Board may implement a system of registration.
4. Certification – When the public requires a substantial basis for relying on the professional services of a practitioner, the Board may implement a system of certification.
5. Licensing – Whenever adequate regulation cannot be achieved by means other than licensing, the Board may establish licensing procedures for any particular profession or occupation.

Pursuant to § 54.1-311.B. of the *Code*, in determining the proper degree of regulation, if any, the Board shall determine the following:

1. Whether the practitioner, if unregulated, performs a service for individuals involving a hazard to the public health, safety or welfare.
2. The opinion of a substantial portion of the people who do not practice the particular profession, trade or occupation on the need for regulation.

3. The number of states which have regulatory provisions similar to those proposed.
4. Whether there is sufficient demand for the service for which there is no regulated substitute and this service is required by a substantial portion of the population.
5. Whether the profession or occupation requires high standards of public responsibility, character and performance of each individual engaged in the profession or occupation, as evidenced by established and published codes of ethics.
6. Whether the profession or occupation requires such skill that the public generally is not qualified to select a competent practitioner without some assurance that he has met minimum qualifications.
7. Whether the professional or occupational associations do not adequately protect the public from incompetent, unscrupulous or irresponsible members of the profession or occupation.
8. Whether current laws which pertain to public health, safety and welfare generally are ineffective or inadequate.
9. Whether the characteristics of the profession or occupation make it impractical or impossible to prohibit those practices of the profession or occupation which are detrimental to the public health, safety and welfare.
10. Whether the practitioner performs a service for others which may have a detrimental effect on third parties relying on the expert knowledge of the practitioner.

Methodology

The Methodology follows the newly adopted *Guidelines for the Evaluation of the Need to Regulate Professions and Occupations* adopted by the Board at its meeting on June 2, 2003:

- Publish the information on the *Study on the Use of Voice Stress Analyzers* in the Virginia Register of Regulations on Monday, August 11, 2003 to begin the sixty day public comment period to end October 10, 2003.
- August 11 and 12^t, 2003 Mail a Memorandum to the public soliciting written comments and provide information regarding the date, time, and location of the public hearing sessions.

Mailings were sent to the following:

- (1) Virginia police departments and sheriff's offices, as well as, any other criminal justice institution registered with the Department of Criminal Justice Services,
- (2) Public Participant Group (PPG) list that the Board maintains,
- (3) Members of the Virginia General Assembly,
- (4) Members of the Virginia Association Civil Liberties Union (ACLU).
- Conduct public hearing session in four geographical locations: Roanoke, Chesapeake, Richmond, and Arlington.
- Research the laws and statutes in other jurisdictions.
- Identify the States and other localities that currently approve or prohibit the use of this detection device.
- Utilize the Internet as a research tool to obtain independent research available on the topic.
- Obtain and review information from other sources on the topic to include publications from books, articles, and journals.
- Review and summarize the written comments from the public received during the sixty day public comment period.

- Review and summarize the contents of the four public comment sessions.

Findings

A. Polygraph history

The polygraph measures changes in a person's body that are associated with the stress of deception. Today, polygraphs customarily measure changes in blood pressure, stomach and chest breathing patterns, galvanic skin response (perspiration), the pulse wave and amplitude. The theory behind polygraph is, when a person lies it produces stress and this stress is reflected in changes in breathing, heart rate and perspiration. Many other changes may occur, but are not necessarily measured by the polygraph equipment: the pupils get larger, digestion slows, and the body's blood supply is redistributed away from the skin and gastrointestinal regions toward the muscles.

Rubber tubes are placed over a subject's chest and abdominal area to measure respiratory activity. Small metal plates attached to the fingers record sweat gland activity and a blood pressure cuff monitors the cardiovascular system.

Conventional machines use moving paper feeders and styluses that record the simultaneous input from the three physiological responses. Computerized polygraphs generate chart analyses from the data and display the results on a computer screen.

A polygraph test consists of only “yes” and “no” questions and is only conducted with the consent of the examinee.

In most cases, decisions are based on analysis of the physiological data recorded using four polygraph channels (cardiovascular, electro dermal, and two respiratory channels). The measures used by the polygraph were selected in the 1920's and 1930's because they were simple to record, they were sensitive, and they were accurate.

The effectiveness of the polygraph has been the subject of hundreds of controlled scientific studies that support its procedures and its continued use. According to Frank Horvath of the American Polygraph Institute, (2002 ABC News, Polygraph Q & A), “critics contend the test is about 70% accurate, while proponents claim it's 90% accurate”.

It is generally accepted that polygraph results are not allowed as evidence in court; however, this may vary from state-to-state and on a case-by -case basis.

Current Cost of equipment: Approximately \$13,000.00

B. Voice stress analyzer history

According to a report on Voice Stress Analyzers, First Sergeant of the Prince William County Police Department – Donald L. Cahill, “The voice stress analyzer first came into being in the law enforcement arena during the early 1970’s through research and development by private individuals and the U.S. Army. Original [sic] developed in the form of the Psychological Stress Evaluator (PSE); its purpose was to graphically display stress in the voice of a speaker when asked relevant questions” (Cahill, 1999, pg. 1).

The theory is that the voice stress analyzer works by measuring “micro-tremors” in the human voice. Micro-tremors are described as, “inaudible vibrations that speed up uncontrollably when a person is lying” (Webby, S., 2001, pg 2). The tremor varies according to the amount of stress. The more stress, the less tremor (Clede, B., 1998, pg.3). While the subject is speaking, the computer equipment measures and displays any changes in the vibrations. For each voice pattern the machine shows a graph: a high peak denotes a true statement, while jagged plateau indicates a lie.

The current computer analyzer equipment utilizes a microphone and can be used covertly, overtly, via telephone or cell phone, tape recorder, and any other technology that can record a voice.

The National Institute for Truth Verification (NITV) manufactures of the computer voice stress analyzer (CVSA™), report that its analyzer has about a 98% accuracy rate. Michael Brick, a Representative of the Southern Association of Certified Voice Stress Analyzers, Inc., stated at the Richmond Public Hearing Session (Reference Transcript), that “It can test any language. I have tested deaf mutes. As long as they can make a sound. If they can make a sound, they can be tested.” He later explained that the youngest person that he tested was four years old and the oldest person was in their late eighties.

As earlier noted with polygraph results, it is generally accepted that voice-stress results are not allowed as evidence in court, however, this may vary from state-to-state and on a case-by-case basis.

Current Cost of the equipment: Approximately \$10,000.00 (will vary by type of equipment selected and the Manufacturer)

a. Types of voice stress analyzers

There are currently many available voice stress analyzers (VSA) on the market today. The major VSA vendors market their products on a laptop with specific software, while few are sold as an electronic device with the software embedded on its chips.

* Some examples are:

- Psychological Stress Evaluator (PSE), Dektor Counterintelligence and Security, Inc.
- Lantern, The Diogenes Group, Inc.
- Vericator, Trustech Ltd. Integritek Systems Inc.
- Computerized Voice Stress Analyzer (CVSA™), National Institute for Truth Verification (NITV)
- VSA Mark 1000, CCS International Inc.
- VSA-15, CCS International Inc.
- Xandi Electronics (markets a kit)

* Reference (Haddad, Ratley, Walter, Smith, 2002)

b. Cost analysis chart of voice stress analyzer v. polygraph

	<u>VSA</u>	<u>Polygraph</u>
Initial cost of system	\$9,250.00	\$13,000.00
Tuition for 1 student	\$1,215.00	\$3,000
Length of training	6 days	8 weeks
Cost of Room and Board @ 70.00 per day	\$420.00	\$3,920.00
Salary for student while in training (U.S. Average)	\$769.00	\$6,153.84
Number of exams that an examiner can Conduct per day	7 exams	2 exams
Average percent of inconclusive results On exams	0%	20%
Can unit analyze audio tapes for truth Verification?	yes	no
Do drugs, medical condition, or age Affect testing?	no	yes

Total expense to purchase 1 unit

And train 1 agent	\$11,654.00	\$26,073.84
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* Reference (Haddad, Ratley, Walter, Smith, 2002)

C. General findings of the literature review

It appears that some law enforcement agencies, outside the boundaries of the Commonwealth of Virginia, are currently utilizing the computer stress analyzer in several different capacities to carry out their duties:

- (1) Overt Interview – a live interview by a Computer Stress Analyzer (CSA) examiner. These interviews are conducted with prior knowledge and permission that certain questions will be recorded live and captured by the CSA equipment for analysis.
- (2) Covert Interview – a live interview by a CSA examiner. These interviews are conducted without the prior knowledge and permission that certain questions will be recorded live and captured by the CSA equipment for analysis.
- (3) Pre-employment screening
- (4) Internal affair investigations

Note: At the discretion of the Director of the Department of Professional and Occupational Regulation (§ 54.1-1805), the Commonwealth of Virginia currently prohibits the use of voice stress analyzers to be used in any law enforcement duty related capacity.

Literature, written comments received and the public hearing session document some of the benefits of being able to use the voice stress analyzer are:

- It would allow law enforcement officers to achieve maximum admissible interrogation results by providing a relaxed environment with no sensors, pressure tubes, and pressure cuffs. Or special chair;
- It is convenient and would allow for interviews to “strike when the iron is hot”;
- It is cost effective;
- It would allow law enforcement to utilize new technology;
- Low training and education time;
- Less time to administer v. the traditional polygraph test.

Detective/Sergeant Don Wiebe of the British Columbia Police Department reports that the CVSA™ has shown a 100% accuracy rate after using it for a six month timeframe. He states that the CVSA™ has been used 35 times and that “all the tests conducted have either had the results confirmed by investigation or confession” (Wiebe, no date given, *Conclusion of the six month report on the computer voice stress analyzer prepared for the Saanich, B.C. police department*).

But, are results confirmed by investigation of confessions the same as validity? Some would argue this as “yes”, while others would argue “no”. This is the center of a revolving argument for those individuals and groups that are either “for” or “against” the use of the voice stress instruments in law enforcement agencies.

A review of the literature revealed that there have been no scientific studies conducted, to date, to measure the validity of the computer stress analyzer to detect deception. It has been argued that the computer stress analyzer is more cost effective, convenient, and more user friendly than the traditional polygraph equipment, however, one question still remains unanswered: how reliable is the equipment in its actual ability to detect, measure, and display changes in voice frequency? Has it ever been scientifically measured? The answer to this question is “no”. Manufacturers contest that their computer stress analyzers are 100% accurate and effective by producing testimonials as a foundation to their claims, but this is not widely accepted as scientific validity.

A Court of Appeals Case (Case no.00-01886-CR), State of Wisconsin v. Paul D. Hoppe (2001), indicates that telling a defendant (during questioning) that a “computer voice stress analyzer” test showed that the defendant’s answers had not been “completely truthful” to be a coercive tactic. The basis for this claim reads:

That is, the reliability of the computer voice stress analyzer test as a “truth verification” method has not been established in the scientific community to the Wisconsin courts and it may never be.

The literature review further revealed a publication announcing a “*Warning to the Public*” on the use computer voice analyzer equipment for pre-employment purposes (2003, *The truth about voice stress technologies*, www.voicestress.org).

The announcement was to those individuals who may have lost a job opportunity with a law enforcement agency because they had wrongly failed a voice stress analyzer test. It states:

Most large police agencies are governed by state or municipal civil service rules or laws, which make them also subject to the US government’s Equal Employment Opportunity Commission (EEOC) rule 29 CFR 1607, the Uniform Guidelines on the Employee Selection Procedures (July 1, 1998). According to the EEOC, all employee selection tools must meet the minimum standards, including validation. It is simply a matter of law that departments must use validated tools for hiring, such as the MMPI, CPI, polygraph, urinalysis, intelligence tests or others that have withstood independent scientific investigation. They are specifically prohibited from using unvalidated methods. The voice analyzer technology falls into the unvalidated category. If you took a voice stress to get a law enforcement job, it is a violation of your rights under

these EEOC provisions. Contact your attorney for more advice.

A 2002 final report on the investigation and evaluation of voice stress analysis technology tested the methodology and results of the testing and evaluation of two voice stress analysis systems. The report concluded, “That the two VSA units do recognize stress through voice analysis; however, although these systems state they detect deception, it was not proven” (Haddad, Ratley, Walter, Smith, 2002).

Another 2002 study conducted by the Department of Defense Polygraph Institute (DoDPI) research division staff investigated the computer voice stress analyzer (CVSA) for its ability to identify stress-related changes in voice. The study provided no evidence to support the CVSA for its ability to identify stress-related changes in the voice (Meyerhoff, Saviolakis, Koenig, & Yurick, 2002).

As previously stated, the polygraph has been the subject of numerous well-controlled laboratory studies and field studies which support the polygraph and its associated procedures and processes. The U.S. Department of Defense Polygraph Institute (DoDPI), which is congressionally mandated to study new technologies and equipment which purport to have values in the area of lie detection, conducts many of these studies. The Department of Defense Polygraph Institute is charged with training all federal examiners including employees of the Secret Service and Federal Bureau of Investigations.

There is an absence of scientific research regarding the voice stress analyzer from the promoters of the equipment and the scientific community. Proponents of the computer stress analyzer claim relatively high deception detection accuracy rates. However, these claims are based primarily on anecdotal evidence rather than evidence obtained through rigorous systematic study.

David Hughes, Executive Director for the National Institute for Truth Verification, in his discussion at the Richmond Public Hearing Session on his experience with the computer voice analyzer stated: (Reference Transcript)

Accuracy rate is a nebulous term. Because if you fail the test and you don't confess, I don't know if it was accurate or not, do I? The case may never be resolved. Just like polygraph, when I used it, it was just a tool. Many, many, many times they didn't confess. I don't know if it was correct or not, in my interpretation, my conclusion, as we call it.

A series of studies by the Department of Defense Polygraph Institute was designed to compare the validity of data collected using a traditional polygraph instrument to that collected using CVSA. The studies have produced no evidence that the use of the CVSA provides accuracy rates better than chance. DoDPI acknowledges that the voice analysis could offer many advantages over current polygraph methodology. For example, voice stress samples can be

recorded without discomfort to the subject. Such devices could also be of benefit to the nation's intelligence and counterterrorism investigation if they could be used secretly. It found to be valid; *any* new device that could supersede the traditional testing devices would be heartily endorsed. Regrettably, DoDPI has found no credible evidence in scientific literature or in their own research that voice stress analysis is an effective tool for determining deception.

Additional studies by DoDPI in 1996 further analyzed the accuracy and effectiveness of the computer voice stress analyzer (Janniro & Cestaro, 1996). Using a mock theft scenario, 109 subjects were randomly assigned to two groups and given detection of deception examinations using a CVSA instrument. Subjects on one group were programmed deceptive and participated in taking \$100.00 from a metal box located in a scenario room. The non-deceptive group did not participate in the scenarios nor did they have knowledge of the mock theft. Four trained and verified CVSA examiners conducted the examinations using a CVSA technique called the Modified Zone of Comparison test. Test chart evaluators, who had not taken part in the study and who were blind to subject programming, obtained an overall accuracy of 49.8%. Decisions were not significantly different from chance in determining deceptive or non-deceptive subjects. The results of this particular study are criticized by those who support the use of the CVSA stating a premise that the CVSA is a stress analyzer that captures and displays degrees of stress based on "jeopardy" and a reasonable degree of accuracy cannot be expected where "jeopardy" does not exist.

The Executive Summary released by the Department of Defense reports that The National Research Council also completed a literature review of VSA in October 2002 and the findings were:

While the initial portion of the report suggests evidence connecting vocal lie production with fluctuations in vocal tension and pitch, the weak support for detecting deception using voice technologies is quickly addressed. Twelve studies were reviewed in this report. The combined results from these VSA studies indicated accuracy rates at or below chance levels, and low levels of reliability, both being necessary cornerstones for a successful diagnostic tool. The report concludes that there is little or no evidence, scientific or otherwise, for the application of VSA in the detection of deception. While it is noted that the possibility exists that VSA may achieve higher accuracy rates with higher-stress paradigms, no such work exists in the known literature.

Finally, several studies that were published in 2002 found the following:

Horvath, Frank. (2002). (Abstract) *Experimental comparison of the psychological stress evaluator and the galvanic skin response in detection of deception*. National Criminal Justice Reference Service. NCJ Number: 196941.

** Full-Text See, Polygraph Journal: Volume 31, Issue (2). 2002.

Focus: examine the validity of the Psychological Stress Evaluator (PSE), a voice mediated lie detector.

Conclusion: findings were consistent with previous research and do not indicate that PSE is effective in detecting deception.

Barland, Gordon. (2002). (Abstract) *Use of voice changes in the detection of deception*.

National Criminal Justice Reference Service. NCJ Number 196942.

** Full-Text See, Polygraph Journal: Volume 31, Issue (2). 2002.

Focus: conduct two experiments assessing the validity of voice stress analysis for the detection of deception.

Conclusion: a certain amount of stress must be reached within an individual before reliable stress-related changes occur in the voice.

Lynch, Brian; & Henry, Donald. (2002). (Abstract) *Validity study of the psychological stress evaluator*. National Criminal Justice Reference Service. NCJ Number: 196938

** Full-Text See, Polygraph Journal: Volume 31, Issue (2). 2002.

Focus: to investigate the validity and inter-judge agreement of the Psychological Stress Evaluator (PSE) through examining the rate of detection of arousal in spoken words.

Conclusion: findings indicate that pattern identification of voice stress resulting from utterance of taboo and neutral words was a chance occurrence. It suggests future studies be conducted to investigate the PSE in comparison with other physiological measures to determine if it is dependent on some minimal level of stress to be effective.

Brenner, M.; Branscomb, H; & Schwartz, G. (2002). (Abstract) *Psychological stress evaluator: Two tests of a vocal measure*. National Criminal Justice Reference Service. NCJ Number: 196939. ** Full-Text See, Polygraph Journal: Volume 31, Issue (2). 2002.

Focus: conduct two laboratory tests/experiments on the validity of the Psychological Stress Evaluator (PSE).

Conclusion: two conclusions drawn from the same evidence include: (1) some aspects of the PSE analysis of stress are valid suggesting the need for further studies; and (2) the present instrument is subject to serious practical problems raising doubts about its appropriateness.

Suzuki, A.; Watanabe, S.; Taheno, Y.; Kosugi, T.; & Kasuya, T. (2002). (Abstract) *Possibility of detecting deception by voice analysis*. National Criminal Justice.

Institute. NCJ Number: 196940.

** Full Text See, Polygraph Journal: Volume 31, Issue (2). 2002.

Focus: conduct a study to measure, analyze, and record voice pitch, intensity, and duration for the analysis of voice from tape recordings for use in lie detection.

Conclusion: the results of the analysis of intensity showed no sign of increasing or decreasing of voices in intensity during the questioning. However, analysis on the duration of subjects' answers showed a higher detection rate than pitch or intensity, but it was not applicable in actual cases. From these results, using pitch, intensity, and duration of voices as a means to detect deception appears slim.

Horvath, Frank. (2002). (Abstract) *Detecting deception: The promise and the reality of voice stress analysis*. National Criminal Justice Institute. NCJ Number: 196936.

** Full Text See, Polygraph Journal: Volume 31, Issue (2). 2002.

Focus: discuss and analyze the major empirical evidence pertaining to the claims made about voice stress analysis, specifically the assertion that voice stress devices are effective in lie detection.

Conclusion: findings were that voice stress devices extract from the vocal spectrum a sub audible microtremor signal that is seen as useful in detecting stress in a speaker's voice. It was found that the promise of voice stress analysis in the lie detection field was not and may never be a reality. The evidence showed that none of the devices were useful in detecting deception. The reliable evidence that that did exist showed that there was no induced stress.

Krapohl, D.; Ryan, A.; & Shull, K. (2002). (Abstract) *Voice stress devices and the detection of lies*. National Criminal Justice Reference Service. NCJ Number: 196933

** Full Text See, Polygraph Journal; Volume: 31, Issue (2). 2002.

Focus: to review what is known about voice stress devices and to what degree voice stress technology can provide a reliable means for detecting deception.

Conclusion: the general conclusion has been that the accuracy is modest to poor for a handful of experimental approaches and uniformly poor for those relying on the device.

D. Other States, Government agencies and voice stress analyzers

Currently, the Commonwealth of Virginia only recognizes and approves the use of the polygraph instrument to detect deception. On this foundation, Mr. Daniele in his comments at the Roanoke public hearing session made a valid point. He states: (Reference Transcript)

“We trust the fact that state says that it (reference to the polygraph) is a valid, truth-seeking instrument to be used. If you approve this (reference to voice stress analyzers) then automatically just by the appearance of it, that everyone is going to believe that the state, Commonwealth of Virginia, is agreeing that this is a valid instrument”.

Written comment letters (Newby, David) and public hearing sessions (Hughes, David and Brick, Michael – Richmond session) made note that the Department of Defense and other federal agencies are using voice stress technology on a regular basis for homeland security and terrorism investigations. However, the statement received from the American Polygraph Association, after investigating this claim, states: “No Department of Defense agency uses any form of voice stress analysis for investigative purposes.” (Written comment – Baum, Sandi).

The only information that this study was able to verify relates to the recent aviation security measures signed by President Bush, S.1447 Sec. 109 (7). This authorizes the Secretary of Transportation to take certain measures, including but not limited to using the computer voice stress analyzer (see Appendix C). It could not be verified if the Secretary of Transportation is presently utilizing the computer voice stress analyzer with success under this provision.

Recent legislation shows that in January 2003, the State of Illinois recently *rejected* a bill that would:

Amend the Detection of Deception Examines Act. Allows an examiner who is a qualified operator of a Computer Voice Stress Analyzer that records voice stress factors pertinent to the detection of deception to use a Computer Voice Stress Analyzer in place of the instrument that records the subject's cardiovascular, respiratory, and galvanic skin response patterns. Sets the minimum training standards for a qualified operator.

Other states that have recently *rejected* similar bills are Texas (1999) and Oklahoma. It appears that out of the 50 states, there are currently only nine states that *do not recognize or approve* the use of computer voice analyzers.

* The complete list:

- Illinois
- Oklahoma
- Michigan
- Texas
- Vermont
- Virginia
- South Carolina
- Kentucky

- North Dakota

* USA TODAY article (2002)

Some other additional information that was found about other states:

Wisconsin - Does not appear regulated, however, voice stress analyzer is part of the definition of "lie detector" in the section of the code regarding employment law. § 111.37(1)(b)

West Virginia - While not specifically prohibiting voice stress analyzers the West Virginia Code seems very much designed (in the education and licensure requirements) to be geared toward polygraph machines. 42CSR6

Utah - Allows the use of computer stress analyzers

Texas – No information found specifically pertaining to voice stress analyzers, however the polygraph law seems to be very similar to Virginia.

Tennessee – No information found specifically pertaining to voice stress analyzers, however the polygraph law requires a polygraph examiner (5) "Polygraph examiner" means any person who purports to be able to detect deception or verify truth of statements through instrumentation or by means of a mechanical device) to successfully complete a school approved by the American Polygraph Association. (Tennessee Code, Title 62, Chapter 27)

Conclusions & Recommendations

A review of the current literature and summarization of the four public hearing sessions and written comments uncover a continuing polarized debate between the polygraph and voice stress communities. The conflict arises from the lengthy history and regulation of the polygraph compared to the mostly unregulated new technology of voice analyzer equipment. There have been several scientific studies conducted on the polygraph over the years, and while no study has indicated the polygraph to be 100% accurate, it has still been deemed a reliable instrument to detect deception when used correctly. On the other hand, there has been no independent scientific evidence to indicate that the computer voice analyzer is a valid instrument to detect deception. The only evidence that has been presented and reviewed, to date, consists of testimonials and other anecdotal evidence.

It is not discounted or overlooked that the computer stress analyzers currently in use, are very well received by the law enforcement at large in the United States. In spite of this, the Polygraph Examiners Advisory Board must rely upon scientific data and research available.

Because there have been no independent scientific studies conducted on the reliability of the computer voice analyzer to detect deception, the Board recommends to the Director of the Department of Professional and Occupational Regulation that computer voice analyzer equipment should not be approved in Virginia at this time.

References

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Appendix(s)

Appendix A - Summaries of Written Comments Received

Appendix B - Attendees of the Public Hearing Session(s)

Appendix C – Aviation and Transportation Security Act S.1447

Appendix D - House Bill No. 2812

Appendix E - Senate Bill No. 1296

Appendix A

Name and Affiliation	Summary of Comments
Leslie C. Cash, Jr., Greene County Sheriff's Office	Supports the use of the CVSA (Computer Voice Stress Analyzer) instruments in law enforcement investigations. Reference to the CVSA as a cost effective "tool" for

	conducting investigation interviews. Support for investigative use only and not for use in pre-employment or Internal Affairs areas.
Leonard G. Cooke, Commonwealth of Virginia Department of Criminal Justice Services	Reports research from two sources: (1) International Association of Chiefs of Police (IACP) website and (2) the National Institute for Justice (NIJ). The IACP website does not present a position of pro or con on the use of voice stress technology. The NIJ revealed various studies that indicate voice stress technology may work, and others that say they do not. Concludes that these devices (voice stress analyzers) have not been shown to differentiate between truth and deception and that most research has produced “negative or mixed findings” of a relationship between voice stress and deception.
Jerrauld C. Jones, Commonwealth of Virginia Department of Juvenile Justice	Reports that the Department of Juvenile Justice has never used computer voice stress analyzers, nor have they conducted any studies into the use of such devices.
George W. Gibbs	Does not support the use of the voice stress analyzer device. Reference to several scientific studies conducted by the U.S. Department of Defense noting an overwhelming conclusion indicating that the accuracy rate of voice stress analysis in detecting deception is no better than chance. Reference to flipping a coin to determine if someone is telling the truth or not. Admits the polygraph isn't perfect, but certainly better than flipping a coin. Main concern is not that the voice stress analyzer would replace the polygraph, but, because the voice stress analyzer test is quick, easy and can be conducted without the subject's knowledge or consent, that some officers may elect to trust its results rather than take the time to have a polygraph exam conducted. Concludes that shortcuts of this nature do not serve the public interest and that the scientific research has proven that voice stress does not work.
Donald A. Weinstein, American Polygraph Association	Support against the use of voice stress technology in Virginia. Attached several documents from studies conducted on the validity and utility of the voice stress technology for review. The Department of Defense Polygraph Institute in their Voice Stress Analysis Position Statement (September 11, 1996)

	concluded that they had found no credible evidence in information furnished by the manufacturers, the scientific literature, or in their own research, that voice stress analysis is an effective investigative tool for determining deception.
David Newby, City of Chesapeake Office of the Sheriff	Support for the use of the voice stress technology to aid law enforcement to do its job better. Stresses the use of the voice stress technology as a tool to better direct resources to meet the needs of law enforcement. Discussion on the studies that have been done to test the credibility of this technology to conclude that the testing of this technology in a laboratory setting without real jeopardy would not produce realistic results. States that the Department of Defense and other federal agencies are using voice stress technology on a regular basis for homeland security and terrorism investigation. Specifically, the Aviation and Transportation Security Act Sec. 109 (a) In General – The Secretary of Transportation for Security may take the following actions: (7) Provide for the use of voice stress analysis, biometric, or other technologies to prevent a person who might pose a danger to air safety or security from boarding the aircraft of an air carrier or foreign air carrier in air transportation or interstate air transportation.
Sandi Baum, Virginia Beach Police Department	Strong support against the use of voice stress technology in Virginia. Main themes: (1) It has not been proven to be an accurate detector of deception (makes references to six studies published in the American Polygraph Association 2002 Volume 31, Number 2); (2) The voice stress technology can be used without the examinee's awareness making compliance with consent regulations such as those the Board has developed for polygraph, easy to subvert, placing the public at greater risk; (3) the American Polygraph Association has investigated the claim that the government is using the voice stress technology on its war on terrorism and issued this statement, "No department of defense agency uses any form of voice stress analysis for investigative purposes."
Donald L. Cahill, Prince William County Police Department	Support for the use of voice stress technology as a "tool" which will help guide the investigation in the proper direction. Discussion on the cost effectiveness of the instrument to enhance the ability of law enforcement staff without the burden of excessive added costs. Minimum standards for training programs are suggested as well as the examination

	<p>requirements and the Board's role as an oversight board.</p>
William I. Ames, Jr., The Diogenes Company	<p>Support for the use of voice stress analysis system as an instrument that records physiological changes pertinent to the determination of truthfulness or the verification of the truth of statements in Virginia. Discussion of approval sought regarding their training and certification program that includes a continuing education. Make claim that their systems are operating in 15 countries and within US Federal agencies.</p> <ul style="list-style-type: none"> • Provided an ISSA (International Society of Stress Analysis) Fact Sheet. • Provided a Diogenes Brochure • Provided a Diogenes written report The paper addresses an emerging technology for a tool for security and law enforcement applications. Claim that voice stress analysis are methodologies for revealing physiological indicators of differences in the stress level of the human subject. • Provided a Prince William County Virginia report on VSA • Provided a course of instruction presentation brochure • And a state of Florida special hearing report
National Institute for Truth Verification	<ul style="list-style-type: none"> • Provided "testimonials" submitted by detectives involved in actual cases. • Provided a list of 131 Florida Law Enforcement Agencies that Utilize the CVSA™ (Computer Voice Stress Analyzer). • Provided a list of 55 North Carolina Law Enforcement Agencies that Utilize the CVSA™ . • Provided a list of Major Law Enforcement Agencies that utilize the instrument, as noted, "By prior agreement federal agencies are not listed". • Provided a list of 20 Maryland Law Enforcement Agencies that Utilize the CVSA™ • Provided An Executive Summary regarding the Computer Voice Stress Analyzer™ . • Provided a comparative cost of the Computer Voice Stress Analyzer™ vs. the polygraph. • Announcement for the fourth quarter, certified examiners courses to be held nationwide. • Article posted in the Washington Times (Tuesday,

	<p>July 22, 2003 – Author, Rowan Scarborough) titled: <i>Saddam's loyalists thwart polygraph tests</i>.</p> <ul style="list-style-type: none"> • Present argument that states, “Unlike the old polygraph, the CVSA™ can analyze both telephonic transmissions as well as recorded conversations to accurately detect deception.” • S. 1447 The Aviation and Transportation Security Act as enacted by the U.S. Congress – Sec. 109. Enhanced Security Measures, (7) Provide for the use of voice stress analysis, biometric, or other technologies to prevent a person who might pose a danger to air safety or security from boarding the aircraft of an air carrier or foreign air carrier in the air transportation or intrastate air transportation. • Article titled, “U.S. Department of Defense Begins Deployment of the CVSA™”. Argument presented states that: The U.S. Department of Defense has begun the deployment of the Computer Voice Stress Analyzer™ throughout the Intelligence community. Although virtually the entire U.S. law enforcement community (nearly 1,400), including most major metropolitan departments, has already switched to the CVSA™ , the DoD (Department of Defense) had no begun deployment of the system due to a negative report issued by the DoD Polygraph Institute. In the report, authored by a DoD Polygraph researcher, Dr. Victor Cestaro, it was reported that after testing the system, the accuracy rate of the CVSA was below 50% in detecting deception.
Bernard H. Levin	Support against the use of voice stress technology as a device to determine deception. Comments were not intended to be comprehensive, but mainly intended to address the question of whether the computer voice stress analyzer can be justified on the basis of available scientific evidence.

Appendix B

Attendees and Speakers of the Public Hearing Session(s):

* Denotes a Speaker

(1) Roanoke, Virginia – August 19, 2003

Raynard Jackson, Chairman of the Board for Professional and Occupational Regulation
Dana Martin, Board Member
Louise F. Ware, Director of the Department of Professional and Occupational Regulation
Sandra W. Ryals, Chief Deputy
Eric Olson, Executive Director
Kimberly L. Freiberger, Regulatory Boards Administrator

* L. C. Cash
* Brian Roberts
* Karl Holzbach
* Rick Daniele
* George McMillan
Rodney Davis
Anthony Ezell
Tim Sanok
George Gibbs
Denise Likens

(2) Chesapeake, Virginia – August 28, 2003

Raynard Jackson, Chairman of the Board for Professional and Occupational Regulation
Thomas J. Meany, Jr., Board Member
Louise F. Ware, Director of the Department of Professional and Occupational Regulation
Sandra W. Ryals, Chief Deputy
Eric Olson, Executive Director
Kimberly L. Freiberger, Regulatory Boards Administrator

* Brian Roberts
* Rick Daniele
* Sandi Baum

* Karl Holzbach

* David Newby

* Jim O'Sullivan

* James Eckenrode

* Irby Turnbull

* D. L. Callahan

* Delegate John Cosgrove

* Senator Blevins

(3) Arlington, Virginia – October 1, 2003

Raynard Jackson, Chairman of the Board for Professional and Occupational Regulation
Julie Clifford, Board Member

Louise F. Ware, Director of the Department of Professional and Occupational Regulation

Sandra W. Ryals, Chief Deputy

Eric Olson, Executive Director

Kimberly L. Freiberger, Regulatory Boards Administrator

* Joe Hughes

* Victor L. Cestaro

* Jim O'Sullivan

(4) Richmond, Virginia – October 7, 2003

Raynard Jackson, Chairman of the Board for Professional and Occupational Regulation
Julie Clifford, Board Member

Susan Ferguson, Board Member

Maxime Frias, Board Member

Dana Martin, Board Member

Leroy Pfeiffer, Board Member

Louise F. Ware, Director of the Department of Professional and Occupational Regulation

Sandra W. Ryals, Chief Deputy

Eric Olson, Executive Director

Kimberly L. Freiberger, Regulatory Boards Administrator

Jim O'Sullivan

Jennifer V. Luckritz

* Karl Holzbach

* David Newby

* David A. Hughes
* Kent Willis
* Otis Whitaker
* Joe Hughes
G. Brain Michaels
A. W. Omohundro
* James Eckenrode
* Michael D. Brick
* Brain Roberts

Appendix C – Aviation and Transportation Security Act S.1447

From the Congressional Records
[DOCID: f:publ071.107]

[[Page 115 STAT. 597]]

Public Law 107-71
107th Congress

An Act

To improve aviation security, and for other purposes. <<NOTE: Nov. 19,
2001 - [S. 1447]>>

Be it enacted by the Senate and House of Representatives of the United States of America in Congress <<NOTE: Aviation and Transportation Security Act.>> assembled,

SECTION 1. SHORT TITLE. <<NOTE: 49 USC 40101 note.>>

This Act may be cited as the ``Aviation and Transportation Security Act''.

TITLE I--AVIATION SECURITY

SEC. 101. TRANSPORTATION SECURITY ADMINISTRATION.

(a) In General.--Chapter 1 of title 49, United States Code, is amended by adding at the end the following:

``Sec. 114. Transportation Security Administration

``(a) In General.--The Transportation Security Administration shall be an administration of the Department of Transportation.

``(b) Under Secretary.--

``(1) Appointment.--The head of the Administration shall be the Under Secretary of Transportation for Security. The Under Secretary shall be appointed by the President, by and with the advice and consent of the Senate.

``(2) Qualifications.--The Under Secretary must--

``(A) be a citizen of the United States; and

``(B) have experience in a field directly related to transportation or security.

``(3) Term.--The term of office of an individual appointed as the Under Secretary shall be 5 years.

``(c) Limitation on Ownership of Stocks and Bonds.--The Under Secretary may not own stock in or bonds of a transportation or security enterprise or an enterprise that makes equipment that could be used for security purposes.

``(d) Functions.--The Under Secretary shall be responsible for security in all modes of transportation, including--

``(1) carrying out chapter 449, relating to civil aviation security, and related research and development activities; and

``(2) security responsibilities over other modes of transportation that are exercised by the Department of Transportation.

``(e) Screening Operations.--The Under Secretary shall--

``(1) be responsible for day-to-day Federal security screening operations for passenger air transportation and intrastate air transportation under sections 44901 and 44935;

[[Page 115 STAT. 598]]

``(2) develop standards for the hiring and retention of security screening personnel;

``(3) train and test security screening personnel; and

``(4) be responsible for hiring and training personnel to provide security screening at all airports in the United States where screening is required under section 44901, in consultation with the Secretary of Transportation and the heads of other appropriate Federal agencies and departments.

``(f) Additional Duties and Powers.--In addition to carrying out the functions specified in subsections (d) and (e), the Under Secretary shall--

``(1) receive, assess, and distribute intelligence information related to transportation security;

``(2) assess threats to transportation;

``(3) develop policies, strategies, and plans for dealing with threats to transportation security;

``(4) make other plans related to transportation security,

including coordinating countermeasures with appropriate departments, agencies, and instrumentalities of the United States Government;

``(5) serve as the primary liaison for transportation security to the intelligence and law enforcement communities;

``(6) on a day-to-day basis, manage and provide operational guidance to the field security resources of the Administration, including Federal Security Managers as provided by section 44933;

``(7) enforce security-related regulations and requirements;

``(8) identify and undertake research and development activities necessary to enhance transportation security;

``(9) inspect, maintain, and test security facilities, equipment, and systems;

``(10) ensure the adequacy of security measures for the transportation of cargo;

``(11) oversee the implementation, and ensure the adequacy, of security measures at airports and other transportation facilities;

``(12) require background checks for airport security screening personnel, individuals with access to secure areas of airports, and other transportation security personnel;

``(13) work in conjunction with the Administrator of the Federal Aviation Administration with respect to any actions or activities that may affect aviation safety or air carrier operations;

``(14) work with the International Civil Aviation Organization and appropriate aeronautic authorities of foreign governments under section 44907 to address security concerns on passenger flights by foreign air carriers in foreign air transportation; and

``(15) carry out such other duties, and exercise such other powers, relating to transportation security as the Under Secretary considers appropriate, to the extent authorized by law.

``(g) National Emergency Responsibilities.--

``(1) In general.--Subject to the direction and control of the Secretary, the Under Secretary, during a national emergency, shall have the following responsibilities:

[[Page 115 STAT. 599]]

``(A) To coordinate domestic transportation, including aviation, rail, and other surface transportation, and maritime transportation (including port security).

``(B) To coordinate and oversee the transportation-related responsibilities of other departments and agencies of the Federal Government other than the Department of Defense and the military departments.

``(C) To coordinate and provide notice to other departments and agencies of the Federal Government, and appropriate agencies of State and local governments, including departments and agencies for transportation, law enforcement, and border control, about threats to transportation.

``(D) To carry out such other duties, and exercise such other powers, relating to transportation during a national emergency as the Secretary shall prescribe.

``(2) Authority of other departments and agencies.--The authority of the Under Secretary under this subsection shall not supersede the authority of any other department or agency of the Federal Government under law with respect to transportation or transportation-related matters, whether or not during a national emergency.

``(3) Circumstances.--The Secretary shall prescribe the circumstances constituting a national emergency for purposes of this subsection.

Appendix D - House Bill No. 2812

CHAPTER 545

An Act to amend and reenact § 54.1-1805 of the Code of Virginia, relating to professions and occupations; regulation of polygraph examiners.

[H 2812]

Approved March 18, 2003

Be it enacted by the General Assembly of Virginia:

1. That § 54.1-1805 of the Code of Virginia is amended and reenacted as follows:

§ 54.1-1805. Instruments to be used; approval of other instruments by Director.

A. Each examiner shall use an instrument which that records permanently and simultaneously the subject's cardiovascular and respiratory patterns as minimum standards, but such an instrument may record additional physiological changes pertinent to the determination of truthfulness.

B. In addition, the Director may approve the use of other instruments that record physiological changes pertinent to the determination of truthfulness or the verification of the truth of statements, including a computer voice stress analyzer, by examiners licensed under this chapter under such conditions as determined by the Director. Such conditions shall include a provision requiring the examiner, prior to the use of such instrument, to (i) complete a Director-approved training course on its operation and (ii) be certified by the manufacturer on the use of such instrument. However, no instrument approved pursuant to this subsection shall be used by a

police department in conducting a background investigation of an applicant for employment as a police officer or in administrative investigations involving a police officer.

2. That the provisions of this act shall expire on July 1, 2005.
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Appendix E - Senate Bill No. 1296

CHAPTER 554

An Act to amend and reenact § 54.1-1805 of the Code of Virginia, relating to professions and occupations; regulation of polygraph examiners.

[S 1296]

Approved March 18, 2003

Be it enacted by the General Assembly of Virginia:

1. That § 54.1-1805 of the Code of Virginia is amended and reenacted as follows:

§ 54.1-1805. Instruments to be used; approval of other instruments by Director.

A. Each examiner shall use an instrument which that records permanently and simultaneously the subject's cardiovascular and respiratory patterns as minimum standards, but such an instrument may record additional physiological changes pertinent to the determination of truthfulness.

B. In addition, the Director may approve the use of other instruments that record physiological changes pertinent to the determination of truthfulness or the verification of the truth of statements, including a computer voice stress analyzer, by examiners licensed under this chapter under such conditions as determined by the Director. Such conditions shall include a provision requiring the examiner, prior to the use of such instrument, to (i) complete a Director-approved training course on its operation and (ii) be certified by the manufacturer on the use of such instrument. However, no instrument approved pursuant to this subsection shall be used by a police department in conducting a background investigation of an applicant for employment as a police officer or in administrative investigations involving a police officer.

2. That the provisions of this act shall expire on July 1, 2005.
-

